REMARKS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-18 are pending in the present application with Claims 10, 13 and 16 having been amended by the present amendment.

In the outstanding Office Action, the amendment filed on June 19, 2002, was objected to under 35 U.S.C. § 132; Claims 1-9 were rejected under 35 U.S.C. § 112, first paragraph; and Claims 1-18 were rejected under 35 U.S.C. § 112, first paragraph.

Applicant thanks the Examiner for the courtesy extended to Applicant's representative on November 20, 2003. During the interview, the rejections noted in the outstanding Office Action were discussed. No agreement was reached pending the Examiner's further review when a response is filed. Arguments presented during the interview are reiterated below.

Regarding the objection to the specification and the rejection of Claims 1-9 under 35 U.S.C. § 112, first paragraph, Applicant's representative explained during the interview that the inequality sign being "less than" (i.e., "<") rather than "greater than" (i.e., ">") is supported in the specification at least at page 13, lines 13-17, which describes that the amount of variations of the scanning position at the junction (i.e., $\Delta L\cos\alpha$) is desirably within half of a marginal distance R (i.e., R/2) which is a minimum distance allowable between two adjacent pixels and is inherent to each optical system. Accordingly, it is respectfully submitted there is support in the specification for the change of the inequality of Claims 1, 4, 7, 13 and 16 and in the specification. Therefore, it is respectfully requested this objection and rejection be withdrawn.

Regarding the rejection of Claims 1-18 under 35 U.S.C. § 112, first paragraph, the outstanding Office Action indicates there would be undue experimentation required to make the claimed invention. However, as argued in the previous response filed July 21, 2003,

Applicants respectfully submit the values L, R and θ, where L is a light path length measured at a level of an image height 0 from the polygon mirror and the photoconductive surface to be scanned, θ is an incident light angle at a predefined position on the photoconductive surface, and R is an image pixel pitch, may be easily measured without undue experimentation to satisfy the claimed relationship so that the connecting part appears to be naturally consecutive. This conclusion will be further substantiated herein below.

Generally, L is a light path length measured when the light reflected by the polygon mirror impinges at right angle on the photoconductive surface and is one of key parameters for an optical scanning system. In the present invention, ΔL represents the displacement of the photoconductive surface in an optical connection region where the scanning operations of the two optical scanning systems are combined. As described in the specification of the present invention, when the displacement is caused by the rotation of the photoconductive drum (i.e., the photoconductive surface) having an axial eccentricity, L represents the greatest and smallest values of the eccentricity. That is, the displacement ΔL is caused by the eccentricity of the rotary photoconductive drum which is typically a key optical element to undergo design optimization. Therefore, the displacement ΔL can be known based on a specification of the eccentricity of the drum (i.e., measurement eccentricity data) without any knowledge of numerical data about the radius of curvature of each surface of each lens/mirror and the refractive index of each lens/mirror, etc.

As to the incident angle of the light at an optical connection position on the photoconductive surface, i.e., θ, it is a parameter which can uniquely be determined by one skilled in the art based on a desired image height H at the optical connection position, the light path length between the polygon mirror and the photoconductive surface, and positions and refractive angles of the respective optical elements (i.e., lenses). In the present invention, however, θ can be determined based on a relationship between the displacement ΔL of the

photoconductive surface and a variation ΔH of the image height H in the optical connection region, wherein the relationship is represented by an equation $\tan\theta = \Delta H/\Delta L$. In practice, a measuring tool is placed at the optical connection position to measure the displacement ΔL of the light path length L and the variation ΔH of the image height H. In one exemplary method, an area sensor arranged in a matrix formation is set in the optical connection position. Then, during the time the light is emitted from a laser diode to the optical connection position, the area sensor is moved by ΔL from a predefined distance, and a displacement distance ΔH can be obtained based on a detection of the area sensor moved.

R is also one of key parameters used in image forming apparatuses and typically appears as resolution (e.g., 1200dpi, 24dpi, etc.) in the specification of printers, for example. In some cases, it possibly happens that an actual pixel pitch differs from a virtual pixel pitch. Therefore, an actual pixel pitch is likely expressed as "a real 1200dpi," for example.

As clearly explained hereinabove, the parameters at issue (i.e., ΔL, θ, and R) can be obtained by one skilled in the art without any knowledge of numerical data about the radius of curvature of each surface of each lens/mirror and the refractive index of each lens/mirror, etc. More specifically, to solve the problem due to the eccentricity of the drum, as described in the specification of the present invention, the variations of the eccentricity can be obtained with the measuring tool such as an area sensor to be set at the optical connection position and the specification of pixel pitch with respect to the image forming apparatus. Further, if the specifications of the eccentricity and the pixel pitch are given, the optical connection position on the photoconductive surface can be optimized by using the measuring tool such as the area sensor set at the optical connection position. Further, if the measuring tool such as the area sensor set at the optical connection position and the specification of the eccentricity are known, it becomes possible to seek an upper limit of the pixel specification capable of generating a preferable image output. For example, at 400 dpi, R is calculated as 25.4

mm/(400-1)=63.7 microns. Accordingly, in light of the above comments, it is respectfully requested this rejection be withdrawn.

Consequently, in light of the above discussion and in view of the present amendment, the present application is believed to be in condition for allowance and an early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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